January 1942 ET-188

United States Department of Agriculture
Bureau of Entomology and Plant Quarantine

A DUST-MIXING APPARATUS FOR PREPARING SMALL QUANTITIES OF COATED OR IMPREGNATED DUST FOR LABORATORY USE

By T. A. Brindley, W. E. Peay, and F. G. Hinman,
Division of Truck Crop and Garden Insect Investigations

Recent developments in the use of materials containing rotenone for insecticidal purposes indicate that in many cases mixtures prepared from extracts of rotenone-bearing roots were more toxic than mixtures prepared from the finely ground roots. Existing laboratory methods of mixing were not satisfactory for preparing small quantities of dust mixtures when the object was to coat or impregnate as many particles of the carrier as possible with the liquid extract. Most methods used to add liquid materials to dust simply involve the addition of the liquid materials to the carrier by pouring them in or spraying them onto the carrier as it is being tumbled in some type of mixer. Such methods often resulted in mixtures in which the added liquids caused the formation of pellets of carrier and liquid which were difficult to break up.

The apparatus shown in figure 1 seemed to overcome this difficulty to a major extent by adding the liquid in an atomized form to a cloud of dust in a mixing chamber. This was accomplished through the use of the nozzle shown in figure 2. A jacket perforated by a number of holes was built around a DeVilbiss atomizer. A cloud of dust could be blown through the perforated jacket while a liquid was being sprayed from the atomizer. The cloud of dust and the atomized liquid were confined in a mixing chamber as shown in figure 1. This chamber is 24 inches long and 10 inches in diameter and is closed at the ends by two plates held in place by thumb screws. The chamber is made tight by rubber gaskets.

The liquid is measured into a calibrated vial attached to the atomizer. The dust is weighed and placed into an apparatus for applying dust quantitatively (described in ET-45, April 1935). Air pressure maintained at 10 pounds per square inch was found to be sufficient to move the dust into the mixing chamber from the uniform dust applicator. The movement of dust and liquid into the mixing chamber is synchronized by eye.

In order to prevent a build-up of pressure in the mixing chamber, which prevents an even flow of the liquid materials, five air outlets one-half inch in diameter were cut in the plate opposite

to that through which the liquid and dust were introduced. These air outlets were covered by several layers of cheesecloth, which permitted the escape of excess air pressure and reduced the loss of dust to a minimum.

The results achieved in mixing several different dust mixtures with this apparatus are shown in table 1.

Table 1.-- Check analysis of materials mixed in laboratory dust-mixing apparatus

Field station sample No.	Mixed to contain the amount indicated, based on the manufacturer's analysis of derris extract (percent) 1/	Amount actually contained, based on analysis made by Division of Insecticide Investigations (percent) 2/	Amount recovered, based on analyses made by Division of Insecticide Investigations (percent)
20	0.25	0.15	0.22
25	0.25	0.15	0.17
31	0.25	0.15	0.12
22	0.50	0.31	0.29
24	0.50	0.31	0.43
30	0.50	0.31	0.34
21	0.75	0.46	0.47
26	0.75	0.46	0.47
29	0.75	0.46	0.47
19	1.00	0.61	0.74
23	1.00	0.61	0.64
28	1.00	0.61	0.62

1/ Manufacturer's analysis, 38.4 percent rotenone.
2/ Insecticide Division analysis, 23.5 percent rotenone.

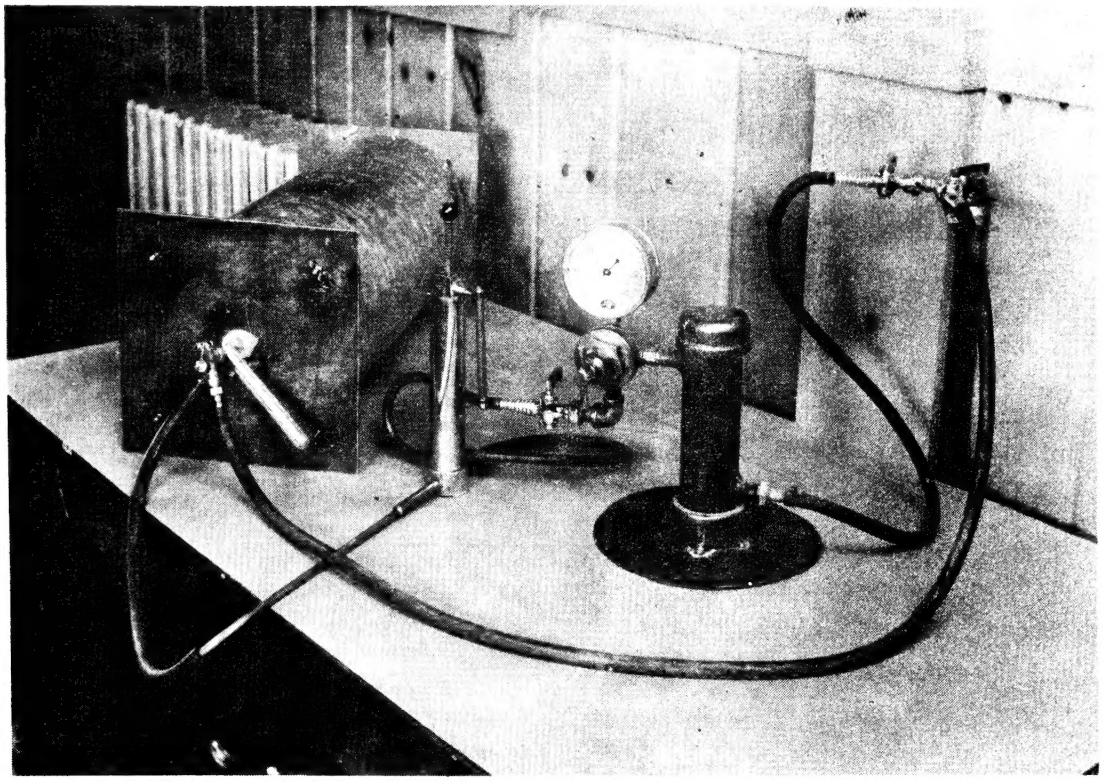

Figure 1.—Dusting-mixing apparatus for impregnating or coating carriers with liquid materials.

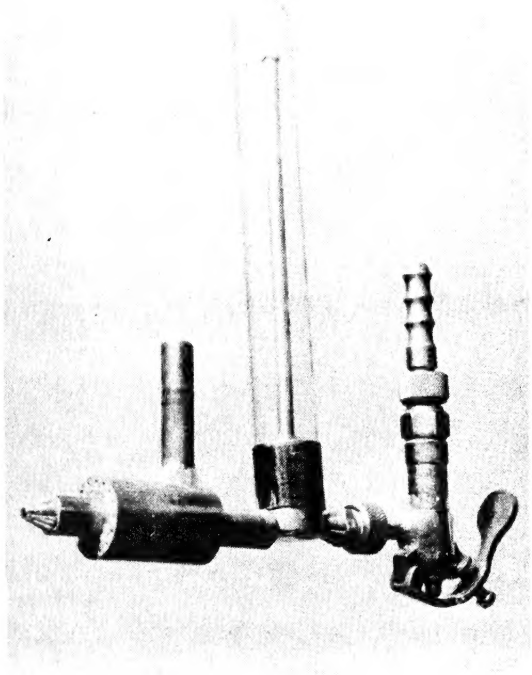

Figure 2.—Nozzle arrangement used on dust-mixing apparatus. This nozzle consists of a DeVilbiss atomizer with a dust nozzle built around the atomizer outlet.